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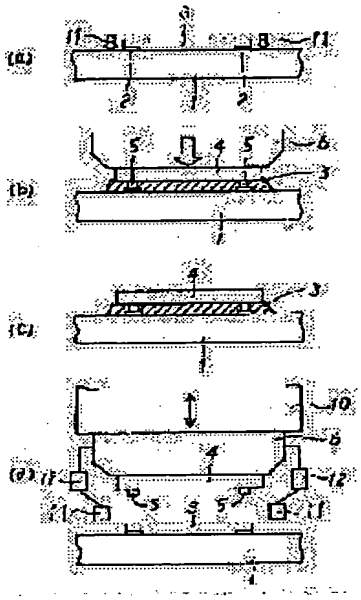
(54) METHOD AND DEVICE FOR MOUNTING SEMICONDUCTOR CHIP

(57)Abstract:

PURPOSE: To improve the mounting reliability of the method and device for mounting a semiconductor chip with its face downward using a thermosetting adhesive.

CONSTITUTION: An adhesive 3 is applied to the semiconductor chip mounting part of a substrate 1, the adhesive 3 is pre-heated by the local heating of the substrate 1, a semiconductor chip 4 which is heated to the thermosetting temperature of the adhesive 3 is pressed to the semiconductor chip mounting part of the substrate 1, and then the adhesive 3 is cured. A semiconductor chip suction means is provided on the lower surface of a pressure head 6 for heating the semiconductor chip 4 to the thermosetting temperature of the adhesive 3, a heating body 11 is lowered from the head 6 by a vertically movable means 12, and the heating body 1 contacts the substrate 1 before the semiconductor chip 4 contacts the adhesive 3.



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CLAIMS

[Claim(s)]
[Claim 1] Thermosetting adhesive (3) It uses and is a semiconductor chip (4). Substrate (1) It faces carrying out face down mounting. This substrate (1) They are these adhesives (3) to the semiconductor chip mounting section. It sticks. This substrate (1) They are these adhesives (3) by local heating. Preheating is performed and it is this semiconductor chip (4). This substrate (1) It presses in the semiconductor chip mounting section, and they are these adhesives (3). The mounting approach of the semiconductor chip characterized by heating to curing temperature and stiffening it.
[Claim 2] Said substrate (1) Local heating is said semiconductor chip (4). Heating object which contacts the perimeter of the mounting section (11 31) The mounting approach of the semiconductor chip according to claim 1 characterized by being made.
[Claim 3] Said substrate (1) The heating object (11) which carries out local heating is said semiconductor chip (4). Said adhesives (3) This substrate heated to curing temperature (1) Heating sticking-by-pressure head turned and pressed (6) The mounting approach of the semiconductor chip according to claim 2 characterized by being heated.
[Claim 4] Said substrate (1) The heating object (31) which carries out local heating is this substrate (1). The mounting approach of the semiconductor chip according to claim 2 characterized by building in the heater which carries out local heating.
[Claim 5] A heating object (11) according to claim 2 is said heating sticking-by-pressure head (6). It hangs free [vertical movement] and is this heating sticking-by-pressure head (6). Said heated semiconductor chip (4) Said adhesives (3) It precedes touching and this heating object (11) is this substrate (1). The mounting approach of the semiconductor chip according to claim 2 characterized by touching.
[Claim 6] Thermosetting adhesive (3) It uses and is a semiconductor chip (4). Substrate (1) It faces carrying out face down mounting. These adhesives (3) It is a semiconductor chip (4) to curing temperature. Said heating sticking-by-pressure head to heat (6) In an inferior surface of tongue, it is this semiconductor chip (4). A means to adsorb is established. This semiconductor chip (4) Said heating object which contacts said perimeter of the mounting section (11 31) The means (12) which can be moved up and down is minded and it is this heating sticking-by-pressure head (6). It hangs. This heating sticking-by-pressure head (6) This semiconductor chip to which it stuck (4) These adhesives (3) Before touching, this heating object (11) is this substrate (1). Mounting equipment of the semiconductor chip characterized by constituting so that it may contact.

[Translation done.]

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1.This document has been translated by computer. So the translation may not reflect the original precisely.
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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the mounting approach of a semiconductor chip, the mounting

equipment for it and the method of making a semiconductor chip mount in a glass substrate especially using a heating sticking-by-pressure head, and its equipment.

[0002] Method ** which carries out face down mounting of the semiconductor chip at a glass substrate [finishing / a panel configuration], using a chip-on glass (COG) method, i.e., adhesives, as the mounting approach of the semiconductor chip used for the product, for example, a method of mounting the semiconductor chip for a panel drive in the liquid crystal display panel filled up with liquid crystal between the glass substrates of a pair, came to be adopted with small [of product size], and thin-shape-izing.

[0003]

[Description of the Prior Art] Drawing 7 is the explanatory view of the conventional approach which carries out face down mounting of the semiconductor chip at the circuit board.

[0004] Drawing 7 R> 7 which shows the general approach of carrying out face down mounting of the semiconductor chip at the circuit board using thermosetting adhesive (a) - (c) It sets. Adhesives 3 are stuck on the front face of the circuit board 1 in which the terminal 2 was formed. many conductors -- After carrying out alignment of the many bumps 5 and the terminal 2 which were formed in the semiconductor chip 4, The bump 5 of a semiconductor chip 4 is pressed for the terminal 2 of the circuit board 1 using the heating sticking-by-pressure head 6, after about 20 to 30 seconds passed and adhesives 3 have hardened, a head 6 is removed, and face down mounting of a semiconductor chip 4 is completed.

[0005] In the mounting approach of this semiconductor chip 4, it is pushed away by the thrust of a semiconductor chip 4 by the adhesives 3 between the bump 5 who projects from the body of a semiconductor chip 4, and the terminal 2 which projects from the semiconductor chip loading side of the circuit board 1, and the hardened adhesives 3 maintain the mechanical junction to the circuit board 1 and a semiconductor chip 4 while maintaining the electrical installation of a bump 5 and a terminal 2.

[0006] Generally, adhesives 3 are thermosetting, for example, stiffen the thermosetting adhesive 3 of an epoxy system at 170 degrees C - about 200 degrees C. The circuit board 1 is then heated through the semiconductor chip 4 -> bump 5 -> terminal 2 and the semiconductor chip 4 -> adhesives 3.

[0007]

[Problem(s) to be Solved by the Invention] In said mounting approach of a semiconductor chip 4, the circuit board 1 is a glass substrate, and when the glass substrate 1 constitutes a liquid crystal display panel, the deviation film put on the liquid crystal and the glass substrate 1 with which the display panel was filled up cannot be heated at 200 degrees C or more. Therefore, when carrying out face down mounting of the semiconductor chip 4, the glass substrate 1 was a room temperature.

[0008] Therefore, a temperature gradient generates the adhesives 3 hardened with heating for 20 seconds - about 30 seconds through a semiconductor chip 4 between the part which touches a semiconductor chip 4, and the part which touches a glass substrate 1.

[0009] In drawing 8 which shows the temperature gradient of the adhesives 3 at the time of mounting of a semiconductor chip 4, it is the temperature rise property of a part that a continuous line A touches a semiconductor chip 4, and the temperature rise property of a part that a continuous line B touches a glass substrate 1, and when about 30 seconds pass and adhesives 3 harden, the temperature of the adhesives 3 of the part which touches a substrate 1 becomes lower about 20-30 degrees C than the part which touches a semiconductor chip 4.

[0010] Said temperature gradient of adhesives 3 causes the fluid unevenness of adhesives 3, and hardening advance unevenness, and as shown in drawing 9 as a result, air bubbles 7 tend to produce it inside the adhesives 3 which completed hardening. These air bubbles 7 made the dependability over mounting of a semiconductor chip 4 fall, and caused connection interrupt of a semiconductor chip 4 at the time of an accelerated test.

[0011] In addition, although the magnitude of the semiconductor chip 4 mounted in a liquid crystal display panel is the present and about 3mmx17mm-1mmx10mm and said temperature gradient of the adhesives 3 which used the small semiconductor chip 4 becomes comparatively small, air bubbles 7 cannot be lost.

[0012]

[Means for Solving the Problem] Drawing 1 is the explanatory view of the basic configuration of this invention. when face down mounting of the semiconductor chip is carried out at a substrate using thermosetting adhesive, this invention approach it is made air bubbles not produce in the hardened adhesives is shown in drawing 1 (a) -- as -- the conductor for semiconductor chip mounting -- the part of the glass substrate 1 which formed the terminal 2 and stuck the thermosetting adhesive 3 for semiconductor chip mounting, i.e., the periphery of the semiconductor chip mounting section, heats with the heating object 11, and preheating of adhesives 3 performs

through a glass substrate 1.
[0013] Subsequently, after performing alignment of the bump 5 and terminal 2 which were formed in the semiconductor chip 4, as shown in drawing 1 (b), the heating sticking-by-pressure head 6 which adsorbs a semiconductor chip 4 on the inferior surface of tongue, and heats a semiconductor chip 4 to the curing temperature of adhesives 3 is used, and the bump 5 of a semiconductor chip 4 is pressed for the terminal 2 of a substrate 1.
[0014] Then, if a head 6 is removed after adhesives 3 harden, as shown in drawing 1 (c), face down mounting of a semiconductor chip 4 will be completed. As the example of a basic configuration of the semiconductor chip mounting equipment important section equipped with the preheating object 11 of a substrate 1 is shown in drawing 1 (d) When the substrate preheating object 11 hangs through the means (for example, spring) 12 which can be moved up and down and a head 6 is made to ****** by actuation of the pressurization cylinder 10 from the heating sticking-by-pressure head 6 which adsorbs a semiconductor chip 4 on the inferior surface of tongue, After the heating object 11 heated by the head 6 touches a substrate 1, the amount of suspension of the heating object 11 is set up so that the semiconductor chip 4 heated by the head 6 may touch adhesives 3.
[0015]
[Function] As explained above, after, as for this invention, the substrate 1 with which the heating object 11 heated the semiconductor chip mounting section (necessary part) of a substrate 1, and local heating was carried out carries out preheating of the adhesives 3, a semiconductor chip 4 heats adhesives 3 to the curing temperature.
[0016] Therefore, when carrying out face down mounting of the semiconductor chip 4 at the glass substrate 1 which constitutes, the substrate 1, for example, the liquid crystal display panel, which cannot heat the whole, the temperature gradient at the time of hardening of adhesives 3 can be controlled, and the air bubbles 7 generated in the conventional approach can be lost now.
[0017] Consequently, high dependability can be secured now to face down mounting of a semiconductor chip 4.
[0018]
[Example] The explanatory view of the main configurations of equipment [in / in the explanatory view of the main configurations of equipment / in / in drawing 2 / the 1st example of this invention /, the explanatory view of the equipment which shows drawing 3 to drawing 2 of operation, and drawing 4 / the 2nd example of this invention], the explanatory view of the substrate preheating object concerning the 3rd example of this invention in drawing 5 , and drawing 6 are the explanatory views of the main configurations of the equipment in the 4th example of this invention.
[0019] In drawing 2 , the inferior surface of tongue of the pressurization cylinder 10 moving up and down is equipped with the heating sticking-by-pressure head 6 which built in the heater. To the inferior surface of tongue of a head 6, the inhalation-of-air hole (adsorption means) which carries out vacuum adsorption of the semiconductor chip 4 carries out opening, and the frame type head 14 for substrate preheating surrounding a semiconductor chip 4 is formed in the side face of a head 6 on it.
[0020] The head 14 for preheating consists of heat-resistant India rubber (means which can be moved up and down) 17 to which a cross section is contained in the KO typeface of the frame type base 15 of the KO typeface cross section where a KO typeface, i.e., downward opening, narrows mostly, the substrate heating object 16 with which the upper part fits in in the KO typeface of a base 15, and the lower limit section projects from a base 15, and a base 15, and always energizes the heating object 16 caudad. In addition, replacement, other elastic bodies, for example, coiled spring, is possible for India rubber 17.
[0021] The heating object 16 which is equivalent to the heating object 11 of drawing 1 , and does not contain a heater comes to be heated by about 150 degrees C by the heating sticking-by-pressure head 6 through a base 15. drawing 3 — setting — many conductors — the sheet-like adhesives 3 are stuck on the front face of the glass substrate 1 in which the terminal 2 was formed (80 degrees C, about 1 second), and after carrying out alignment of the many bumps 5 and the substrate terminal 2 which were formed in the semiconductor chip 4, the inferior surface of tongue of the heated substrate heating object 16 is contacted on the front face of a substrate 1 only about dozens seconds by ****** of the pressurization cylinder 10.
[0022] Then, the heat of the heating object 16 spreads to a substrate 1, and it comes to be heated by the suitable about temperature which is extent to which hardening of adhesives 3 does not progress the semiconductor chip mounting section of a substrate 1 remarkably, for example, 120 degrees C.
[0023] Subsequently, the pressurization cylinder 10 is made to descend further so that India rubber 17 may be compressed, and face down mounting of a semiconductor chip 4 is completed, without generating air bubbles in

adhesives 3, if the semiconductor chip adsorption power of a head 6 is canceled and the pressurization cylinder 10 is raised, after a bump 5 makes it maintain about dozens seconds where a terminal 2 is contacted and stiffens adhesives 3.

[0024] In drawing 4 , the metallic ornaments (heating object) 21 equivalent to the heating object 11 of drawing 1 hang to an inferior surface of tongue in the side face of the heating sticking-by-pressure head 6 which carries out vacuum adsorption of the semiconductor chip 4. And the metallic ornaments 21 by which the long hole 22 which has die length was formed in the vertical direction can hang on the side face of a head 6 according to the **** 23 into which a long hole (means which can be moved up and down) 22 fits free [vertical movement], and only the die length of a long hole 22 can move up and down freely with the weight of itself.

[0025] And the metallic ornaments 21 heated by the sticking-by-pressure head 6 enable face down mounting of the semiconductor chip 4 which does not produce air bubbles in adhesives 3 like the heating object 16. In drawing 5 , the sheet 31 for glass substrate local heating concerning this invention approach (heating object) sandwiches the exoergic sheet by energization with the insulating film of a pair, and carries and uses it for the semiconductor chip mounting section of a glass substrate 1.

[0026] The example of drawing 6 equips the sticking-by-pressure head 6 with a sheet 31, and are that vertical movement [sheet / 31] is free and an example of a configuration which carries out preheating of the adhesives 3 through a substrate 1, and was made to carry out face down mounting of the semiconductor chip 4 by vertical movement of a head 6.

[0027] From the method which carries out preheating of the attachment adhesives 3 of a substrate 1 by the heating object 16 or metallic ornaments 21 using the heat transmission from the heating sticking-by-pressure head 6, the equipment of drawing 6 which is the example which hung from the side face of the sticking-by-pressure head 6, and equipped with the sheet 31 the metallic ornaments 21 of the pair which can move up and down freely has the good preheating effectiveness of adhesives 3, namely, can shorten the duration of preheating.

[0028]

[Effect of the Invention] This invention loses to a substrate the air bubbles of the adhesives which carried out face down mounting of the semiconductor chip, and enabled it to secure high dependability to face down mounting, as explained above.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The explanatory view of the basic configuration of this invention

[Drawing 2] The explanatory view of the main configurations of the equipment in the 1st example of this invention

[Drawing 3] The explanatory view of the equipment shown in drawing 2 of operation

[Drawing 4] The explanatory view of the main configurations of the equipment in the 2nd example of this invention

[Drawing 5] The explanatory view of the substrate preheating object concerning the 3rd example of this invention

[Drawing 6] The explanatory view of the main configurations of the equipment in the 4th example of this invention

[Drawing 7] The explanatory view of the conventional approach which carries out face down mounting of the semiconductor chip

[Drawing 8] Thermal mapping of the adhesives at the time of semiconductor chip mounting by the conventional approach

[Drawing 9] The explanatory view of the air bubbles generated inside the adhesives by the conventional approach

[Description of Notations]

1 Semiconductor Chip Mounting Substrate
2 Conductor -- Terminal
3 Thermosetting Adhesive
4 Semiconductor Chip
5 Bump
6 Heating Sticking-by-Pressure Head
11 16 Heating object which heats a substrate part
12 Means Which Can be Moved Up and Down
17 India Rubber (Means Which Can be Moved Up and Down)
21 Metallic Ornaments (Heating Object)
22 Long Hole (Means Which Can be Moved Up and Down)
31 Heating Sheet (Heating Object)

[Translation done.]

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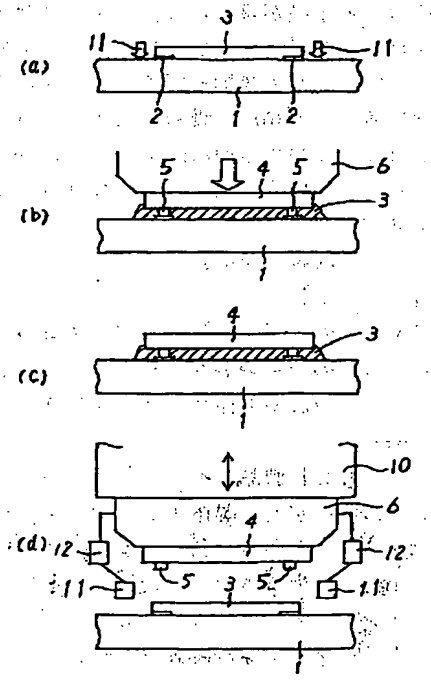
(54)【発明の名称】　半導体チップの実装方法と実装装置

(57)【要約】
【目的】　熱硬化性接着剤を用いて半導体チップをフェイスダウン実装する方法とそのための装置に関し、実装の信頼性を向上させる。
【構成】　基板１の半導体チップ実装部に接着剤３を貼着し、基板１の局部加熱によって接着剤３の予備加熱を行い、接着剤３の硬化温度に加熱した半導体チップ４を基板１の半導体チップ実装部に押圧し、接着剤３を硬化させる。接着剤３の硬化温度に半導体チップ４を加熱する圧着ヘッド６の下面には半導体チップ吸着手段が設けられ、加熱体11が上下動自在手段12を介してヘッド６より垂下し、半導体チップ４が接着剤３に接する前に加熱体11が基板１に当接するように構成する。

本発明の基本構成の説明図



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【特許請求の範囲】

【請求項１】　熱硬化性接着剤(3) を用いて半導体チップ(4) を基板(1) にフェイスダウン実装するに際し、該基板(1) の半導体チップ実装部に該接着剤(3) を貼着し、該基板(1) の局部加熱によって該接着剤(3) の予備加熱を行い、該半導体チップ(4) を該基板(1) の半導体チップ実装部に押圧し、該接着剤(3) を硬化温度に加熱して硬化させること、を特徴とする半導体チップの実装方法。

【請求項２】　前記基板(1) の局部加熱は、前記半導体チップ(4) 実装部の周囲に当接する加熱体(11, 31) によりなされること、を特徴とする請求項１記載の半導体チップの実装方法。

【請求項３】　前記基板(1) を局部加熱する加熱体(11) が、前記半導体チップ(4) を前記接着剤(3) の硬化温度に加熱した該基板(1) に向けて押圧する加熱圧着ヘッド(6) により加熱されること、を特徴とする請求項２記載の半導体チップの実装方法。

【請求項４】　前記基板(1) を局部加熱する加熱体(31) が、該基板(1) を局部加熱するヒータを内蔵すること、を特徴とする請求項２記載の半導体チップの実装方法。

【請求項５】　請求項２記載の加熱体(11) が前記加熱圧着ヘッド(6) より上下動自在に垂下し、該加熱圧着ヘッド(6) により加熱された前記半導体チップ(4) が前記接着剤(3) に接するのに先立って該加熱体(11) が該基板(1) に接すること、を特徴とする請求項２記載の半導体チップの実装方法。

【請求項６】　熱硬化性接着剤(3) を用いて半導体チップ(4) を基板(1) にフェイスダウン実装するに際し、該接着剤(3) の硬化温度に半導体チップ(4) を加熱する前記加熱圧着ヘッド(6) の下面には該半導体チップ(4) を吸着する手段が設けられ、該半導体チップ(4) の前記実装部周囲に当接する前記加熱体(11, 31) が上下動自在手段(12)を介して該加熱圧着ヘッド(6) より垂下し、該加熱圧着ヘッド(6) に吸着した該半導体チップ(4) が該接着剤(3) に接する前に該加熱体(11) が該基板(1) に当接するように構成したこと、を特徴とする半導体チップの実装装置。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は半導体チップの実装方法とそのための実装装置、特に、加熱圧着ヘッドを用いてガラス基板に半導体チップを実装させる方法とその装置に関する。

【０００２】製品サイズの小型，薄型化に伴って、その製品に使用する半導体チップの実装方法、例えば一対のガラス基板の間に液晶を充填した液晶表示パネルにパネル駆動用の半導体チップを実装する方法として、チップ・オン・グラス（ＣＯＧ）方式、即ち、接着剤を用い半導体チップをパネル構成済みのガラス基板にフェイスダウン実装する方式、が採用されるようになった。

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【０００３】

【従来の技術】図７は回路基板に半導体チップをフェイスダウン実装する従来方法の説明図である。

【０００４】熱硬化性接着剤を用いて半導体チップを回路基板にフェイスダウン実装する一般的な方法を示す図７(a) ～(c) において、多数の導体端子２を形成した回路基板１の表面に接着剤３を貼着し、半導体チップ４に形成した多数のバンプ５と端子２との位置合わせをしたのち、加熱圧着ヘッド６を用いて半導体チップ４のバンプ５を回路基板１の端子２に押圧し、２０～３０秒程度経過し接着剤３が硬化した状態でヘッド６を除去し、半導体チップ４のフェイスダウン実装が完了する。

【０００５】かかる半導体チップ４の実装方法において、半導体チップ４の本体より突出するバンプ５と、回路基板１の半導体チップ搭載面より突出する端子２との間の接着剤３は、半導体チップ４の押圧力によって押し退けられ、硬化した接着剤３はバンプ５と端子２との電気的接続を維持すると共に、回路基板１と半導体チップ４との機械的接合を維持する。

【０００６】一般に接着剤３は熱硬化性であり、例えばエポキシ系の熱硬化性接着剤３は１７０℃～２００℃程度で硬化させる。そのとき回路基板１は、半導体チップ４→バンプ５→端子２および半導体チップ４→接着剤３を介して加熱される。

【０００７】

【発明が解決しようとする課題】半導体チップ４の前記実装方法において、回路基板１がガラス基板であり、そのガラス基板１が液晶表示パネルを構成したものであるとき、表示パネルに充填した液晶およびガラス基板１に被着した偏向膜は２００℃以上に加熱できない。従って、半導体チップ４をフェイスダウン実装するとき、ガラス基板１は室温であった。

【０００８】そのため、半導体チップ４を介して２０秒～３０秒程度の加熱で硬化する接着剤３は、半導体チップ４に接する部分とガラス基板１に接する部分との間に温度差が発生する。

【０００９】半導体チップ４の実装時における接着剤３の温度差を示す図８において、実線Ａは半導体チップ４に接する部分の温度上昇特性、実線Ｂはガラス基板１に接する部分の温度上昇特性であり、３０秒程度経過し接着剤３が硬化した時点で、基板１に接する部分の接着剤３の温度は、半導体チップ４に接する部分より２０～３０℃程度低くなる。

【００１０】接着剤３の前記温度差は、接着剤３の流動性むら，硬化進行むらを招き、その結果図９に示す如く、硬化を完了した接着剤３の内部に気泡７が生じ易い。かかる気泡７は、半導体チップ４の実装に対する信頼性を低下せしめ、加速試験時に半導体チップ４の接続断の要因になった。

【００１１】なお、液晶表示パネルに実装する半導体チップ４の大きさは、現在、３㎜×１.７㎜～１㎜×１０㎜程度であり、小型の半導体チップ４を使用した接着剤３の前記温度差は比較的小さくなるが、気泡７をなくすことができない。

【００１２】

【課題を解決するための手段】図１は本発明の基本構成の説明図である。熱硬化性接着剤を用いて半導体チップを基板にフェイスダウン実装したとき、硬化した接着剤内に気泡が生じないようにする本発明方法は、図１（ａ）に示す如く、半導体チップ実装用の導体端子２を形成し半導体チップ実装用の熱硬化性接着剤３を貼着したガラス基板１の局部、即ち半導体チップ実装部の周辺部を加熱体１１で加熱し、ガラス基板１を介して接着剤３の予備加熱を行なう。

【００１３】次いで、半導体チップ４に形成したバンプ５と端子２との位置合わせを行なったのち、図１（ｂ）に示す如く、半導体チップ４を下面に吸着し半導体チップ４を接着剤３の硬化温度に加熱する加熱圧着ヘッド６を使用し、半導体チップ４のバンプ５を基板１の端子２に押圧する。

【００１４】そこで、接着剤３が硬化してからヘッド６を除くと、図１（ｃ）に示す如く半導体チップ４のフェイスダウン実装が完了する。基板１の予備加熱体１１を具えた半導体チップ実装装置要部の基本構成例は図１（ｄ）に示す如く、下面に半導体チップ４を吸着する加熱圧着ヘッド６から、上下動自在手段（例えばばね）１２を介して基板予備加熱体１１が垂下し、加圧シリンダ10の動作によってヘッド６を降下動させたとき、ヘッド６によって加熱された加熱体１１が基板１に接したのち、ヘッド６によって加熱された半導体チップ４が接着剤３に接するように、加熱体１１の垂下量を設定する。

【００１５】

【作用】以上説明したように本発明は、加熱体１１が基板１の半導体チップ実装部（所要局部）を加熱し、局部加熱された基板１が接着剤３を予備加熱したのち、半導体チップ４が接着剤３をその硬化温度に加熱する。

【００１６】従って、全体を加熱できない基板１例えば液晶表示パネルを構成するガラス基板１に半導体チップ４をフェイスダウン実装するとき、接着剤３の硬化時における温度差を抑制し、従来方法において発生した気泡７をなくすことができるようになる。

【００１７】その結果、半導体チップ４のフェイスダウン実装に対し、高い信頼性を確保できるようになった。

【００１８】

【実施例】図２は本発明の第１の実施例における装置の主要構成の説明図、図３は図２に示す装置の動作説明図、図４は本発明の第２の実施例における装置の主要構成の説明図、図５は本発明の第３の実施例に係わる基板予備加熱体の説明図、図６は本発明の第４の実施例における装置の主要構成の説明図である。

【００１９】図２において、上下動する加圧シリンダ１０の下面にはヒータを内蔵した加熱圧着ヘッド６を装着する。ヘッド６の下面には、半導体チップ４を真空吸着する吸気孔（吸着手段）が開口し、ヘッド６の側面には半導体チップ４を囲う枠型の基板予備加熱用ヘッド１４を設ける。

【００２０】予備加熱用ヘッド１４は、断面がほぼコ字形即ち下向き開口が窄まるコ字形断面の枠型基体１５，上部が基体１５のコ字形内に嵌合し下端部が基体１５より突出する基板加熱体１６，基体１５のコ字形内に収納され加熱体１６を常時下方に付勢する耐熱性弾性ゴム（上下動自在手段）１７からなる。なお、弾性ゴム１７は他の弾性体例えばコイルばねに置き換え可能である。

【００２１】図１の加熱体１１に相当しヒータを内蔵しない加熱体１６は、基体１５を介して加熱圧着ヘッド６により、例えば１５０℃程度に加熱されるようになる。図３において、多数の導体端子２を形成したガラス基板１の表面に、シート状の接着剤３を貼着し（８０℃，１秒程度）、半導体チップ４に形成した多数のバンプ５と基板端子２との位置合わせをしたのち、加圧シリンダ１０の降下動によって、加熱された基板加熱体１６の下面を基板１の表面に数十秒程度だけ接触させる。

【００２２】すると、加熱体１６の熱が基板１に伝播し、基板１の半導体チップ実装部を接着剤３の硬化が著しく進まない程度の適当な温度、例えば１２０℃程度に加熱されるようになる。

【００２３】次いで、弾性ゴム１７が圧縮されるように加圧シリンダ１０をさらに降下せしめ、バンプ５が端子２に当接した状態で数十秒程度維持せしめ接着剤３を硬化させたのち、ヘッド６の半導体チップ吸着力を解除し加圧シリンダ１０を上昇させると、接着剤３内に気泡を発生させることなく、半導体チップ４のフェイスダウン実装が完了する。

【００２４】図４において、下面に半導体チップ４を真空吸着する加熱圧着ヘッド６の側面には、図１の加熱体１１に相当する金具（加熱体）２１が垂下する。そして、上下方向に長さを有する長孔２２が設けられた金具２１は、長孔（上下動自在手段）２２が上下動自在に嵌合するねじ２３によってヘッド６の側面に垂下し、それ自体の重量によって長孔２２の長さだけ上下動自在である。

【００２５】そして、圧着ヘッド６によって加熱される金具２１は加熱体１６と同様に、接着剤３に気泡を生じない半導体チップ４のフェイスダウン実装を可能にする。図５において、本発明方法に係わるガラス基板局部加熱用シート（加熱体）３１は、通電による発熱シートを一対の絶縁フィルムで挟んだものであり、ガラス基板１の半導体チップ実装部に搭載し使用する。

【００２６】図６の実施例は、シート３１を圧着ヘッド

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６に装着し、シート３１を上下動自在かつヘッド６の上下動によって、基板１を介する接着剤３を予備加熱し、半導体チップ４をフェイスダウン実装するようにした構成例である。

【００２７】圧着ヘッド６の側面より垂下し上下動自在な一対の金具２１にシート３１を装着した実施例である図６の装置は、加熱圧着ヘッド６からの熱伝動を利用じた加熱体１６または金具２１により基板１の貼着接着剤３を予備加熱する方式より、接着剤３の予備加熱効率がよい、即ち予備加熱の所要時間を短縮できる。

【００２８】

【発明の効果】以上説明したように本発明は、基板に半導体チップをフェイスダウン実装した接着剤の気泡をなくし、フェイスダウン実装に対し高い信頼性を確保できるようにした。

【図面の簡単な説明】

【図１】　本発明の基本構成の説明図

【図２】　本発明の第１の実施例における装置の主要構成の説明図

【図３】　図２に示す装置の動作説明図

【図４】　本発明の第２の実施例における装置の主要構成の説明図

【図５】　本発明の第３の実施例に係わる基板予備加熱

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体の説明図

【図６】　本発明の第４の実施例における装置の主要構成の説明図

【図７】　半導体チップをフェイスダウン実装する従来方法の説明図

【図８】　従来方法による半導体チップ実装時の接着剤の温度分布図

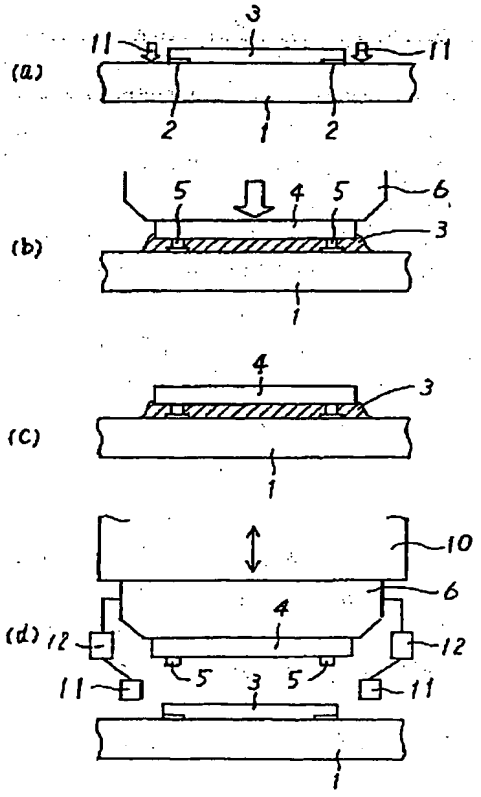
【図９】　従来方法による接着剤内部に発生する気泡の説明図

【符号の説明】

１　半導体チップ実装基板
２　導体端子
３　熱硬化性接着剤
４　半導体チップ
５　バンプ
６　加熱圧着ヘッド
１１，１６　基板局部を加熱する加熱体
１２　上下動自在手段
１７　弾性ゴム（上下動自在手段）
２１　金具（加熱体）
２２　長孔（上下動自在手段）
３１　加熱シート（加熱体）

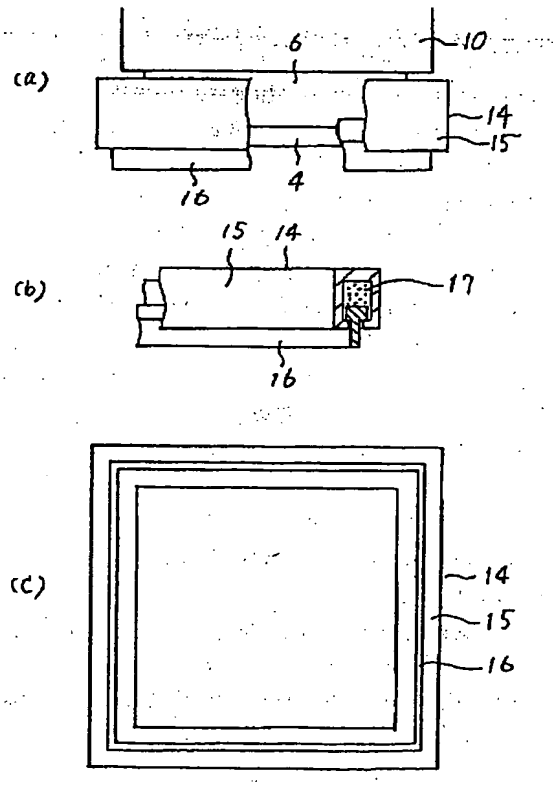
【図１】

本発明の基本構成の説明図



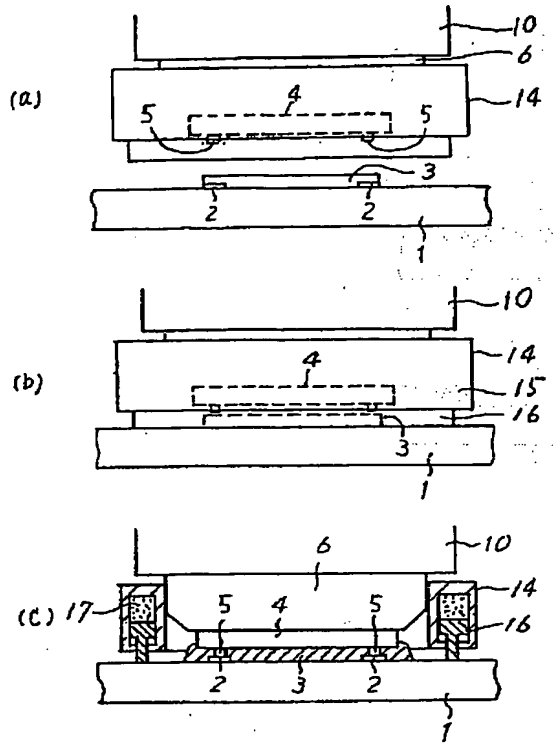
【図２】

本発明の第１の実施例における装置の主要構成の説明図



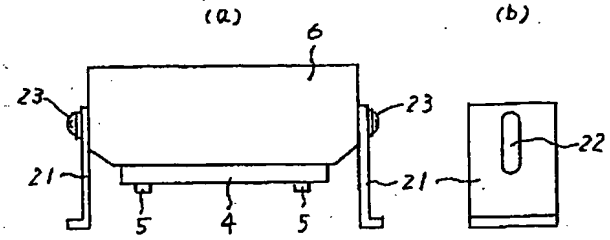
【図３】

図２に示す装置の動作説明図



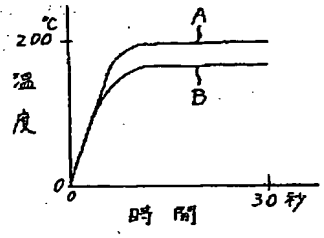
【図４】

本発明の第２の実施例における装置の主要構成の説明図



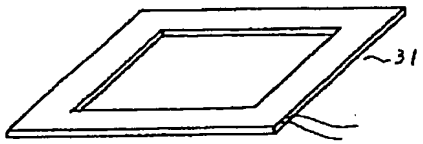
【図８】

従来方法による半導体チップ実装時の接着剤の温度分布図



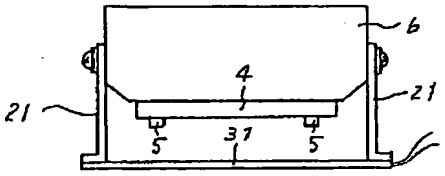
【図５】

本発明の第３の実施例に係わる基板予備加熱体の説明図



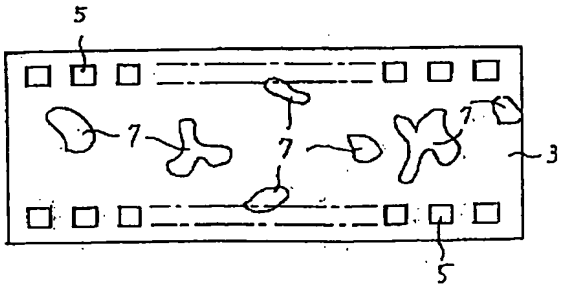
【図６】

本発明の第４の実施例における装置の主要構成の説明図



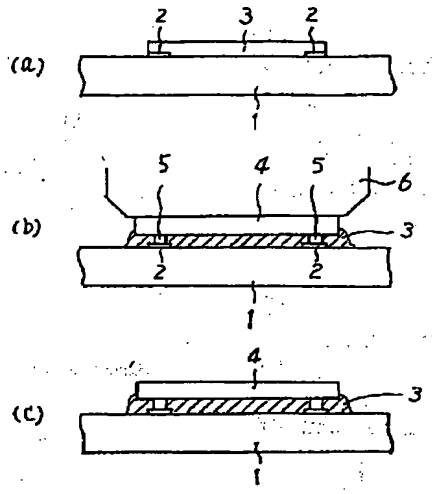
【図９】

従来方法による接着剤内部に発生する気泡の説明図



【図７】

半導体チップをフェイスダウン実装する従来方法の説明図



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